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CASE PRESENTATION

Rhabdomyolysis induced by Boiled cola consumption; a case report

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ABSTRACT

Keyword: boiled cola, abortion induction, rhabdomyolysis, case report.

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Background: Rhabdomyolysis is a medical condition ranges from an asymptomatic illness to a life-threatening condition. Misoprostol is a prostaglandin E1 analogue used for induction of abortion in both early and advanced stages of pregnancy. In this report, we show a completely different cause of rhabdomyolysis and acute kidney injury with good outcom **Case presentation:** We present a case of 33- year-old Egyptian lady, pregnant in her 2nd month; she planned for abortion, so she received 2 tablets of misoprostol (400 mcg) and 4 cans of boiled cola per day for 5 days. On the 6th day; she presented to emergency room (ER) by vaginal bleeding, abdominal pain, diarrhea, fever, jaundice and dark urine. **Conclusion:** This is a rare case of rhabdomyolysis of unclear cause, which may be secondary to misoprostol toxicity induced by boiled cola or direct effect of frequent used boiled cola. .

INTRODUCTION

Rhabdomyolysis is a medical condition results from dissolution of damaged skeletal muscle, this dissolution causes direct release of electrolytes and intracellular components of muscle, including creatine kinase (CK), lactate dehydrogenase, myoglobin and aldolase into the circulation and extracellular space. The severity of rhabdomyolysis can vary from an asymptomatic illness to a potentially fatal condition associated with significantly increased CK levels, electrolyte imbalances, disseminated intravascular coagulation and acute renal failure (ARF) [1].

The primary cause of rhabdomyolysis is mainly direct traumatic injury to the muscles; however, it can also be triggered by infections, toxins, muscle ischemia, electrolyte imbalances, drugs, vigorous exercise, metabolic disorders, prolonged bed rest, or conditions related to temperature regulation, such as neuroleptic malignant syndrome and malignant hyperthermia [2.]

Following muscle injury, a significant amount of myoglobin is released into plasma, exceeding its protein binding capacity and precipitating in glomerular filtrate, this excess myoglobin can lead to direct nephrotoxicity, renal tubule obstruction, renal vasoconstriction, and acute kidney injury (AKI)[3.]

Misoprostol, an analogue of prostaglandin E1 (PGE1); is currently the recommended medication for induced abortion, in both early and advanced stages of pregnancy, A dose of 800 mcg vaginally is suggested for the evacuation of the uterus during pregnancy loss up to 13 weeks[4].

Toxic doses have not been well established but cumulative doses of up to 2,200 mcg in 12 hours are well tolerated without significant side effects. However, a case of non-lethal misoprostol overdose was reported following ingestion of 6,000 mcg, which resulted in hyperthermia, hypoxemia, metabolic acidosis and rhabdomyolysis [5.]

Currently, the management of acute misoprostol toxicity primarily involves supportive care. In case of oral ingestion, a one-time dose of activated charcoal with the dosage of 0.5-1g/kg should be administered. When using misoprostol intravaginally, attempt to remove it. For patients experiencing agitation, sedation can be provided through the use of benzodiazepines, barbiturates, or intubation with neuroparalytic therapy in severe cases. In case of hypotension and hyperthermia; cooling blanket therapies, crystalloids and vasopressors may be administered if necessary[6].

It has been found that soft-drink consumption is associated with hypertension, diabetes, and renal stones[7], particularly in cola beverages which are acidified with phosphoric acid resulting in urinary changes that usually accelerate the renal stones formation. Patients with kidney disease or kidney stones are advised to avoid cola beverages [8.]

Consuming two or more carbonated drinks per day, whether diet or normal, may increase the risk of chronic kidney disease, as evidenced by a study published in the Clinical Journal of the American Society of Nephrology in 2010, which found that women who consumed two or more servings of diet Coke per day had a 30% decrease in glomerular filtration rates[9.]

Boiling Coca-Cola results in transformation from a carbonated beverage to a viscous liquid. This process results in the release of carbon dioxide gas, causing the drink to become significantly sweeter. Additionally, the concentration of caffeine in the beverage becomes more concentrated[10].

Case presentation

We present a case of 33-year-old Egyptian lady, she presented to emergency room (ER) by sudden vaginal bleeding associated with lower abdominal pain, diarrhea, fever, and dark urine, not associated with vomiting, loin pain or dysuria.

The patient discovered an unplanned pregnancy at 8 weeks of gestation. She had young baby, therefore she planned for induced abortion and sought advice from her friends for a natural recipe for termination of her pregnancy; some friends recommended the use of misotac tablets (Misoprostol) and boiled cola. Subsequently, she took 2 tablets of misoprostol (400 mcg) and consumed 4 cans of boiled cola per day for 5 days. On the 6th day (4\5\2023) the patient attended to ER by presenting symptoms.

History of 2 cesarean sections without any complications or blood transfusion,

No history of herbal or nephrotoxic medications. No family, psychosocial or past history of medical importance.

Upon testing, both urine and blood samples were jet black; the clinical pathology laboratory reported that the sample color was abnormal and the sample was hemolyzed, which interfered with the analysis of the sample, necessitating another blood sample, approximately four blood samples were collected for the patient's initial lab investigations.

During examination, the patient had fair general condition; heart rate was 92 beats per minute with a blood pressure of 140/70 mm Hg, temperature of 38 C and respiratory rate of 18 cycles /minute. Additionally, pallor and jaundice were observed. Chest and heart were clinically free, the abdominal examination revealed; abdominal tenderness and scar of previous cesarean section without any mass or swelling, no lower limb edema. A gynecological consultation confirmed the patient had experienced a complete abortion.

The patient was admitted to the internal medicine department at Aswan University Hospital, and the initial laboratory investigations revealed anemia, leukocytosis, impaired kidney function, elevated bilirubin and liver function.

The patient received supportive treatment including (antibiotic, fluid resuscitation, and anti hyperkalemic measures). Although the anemia and kidney function had deteriorated; the patient still anuric after resuscitation of circulation, therefore the patient received packed RBCs and was maintained on hemodialysis for 1 month until recovery at 5\6\2023 and the patient discharged with regular follow up in outpatient clinic for 3 month. On follow up; the patient doing well with normal all laboratory investigations

Differential diagnosis of our case;

- Hemolysis and rhabdomyolysis secondary to boiled cola either due to it is direct effect or induction of misoprostol toxicity despite being administered at a therapeutic dose
- Sepsis induced organ dysfunction
- TMA (thrombotic microangiopathy)
- SLE (systemic lupus erythematosus)
- HELLP syndrome

Investigations:

- **Blood film shows; neutrophilia** with presence of myelocyte and promyelocyte, no schistocyte.
- **Blood culture &urine culture;** were negative
- **Pelvi-abdominal ultrasound:**

Bilateral grade 1 nephropathy

Bulky uterus

- **Echocardiography:**

Normal finding

- **Urine analysis:**

Pus cells; 14:16

Red blood cells; 13:15

Protein; ++

Albumin/creatinine ratio: 344 mg/g

Myoglobin; +ve

	1st day	2nd day	3rd day	4th day	7th day	2nd WK	3rd WK	4th WK
HB	9.8	7	6	6	7.8	8.4	9.2	9.2
MCV	80	83	84	80	83	82	89	88
MCH	28	28	30	29	29	28	29	30
WBC	24	34	35	41	27	14	5.8	5.5
PLT	223	200	180	101	65	215	400	420
Urea	50	112	171	268	150	117	90	38
Creatinine	2	3.4	5.4	6.8	6	6	4	1.4
Na	135	145	150	154	145	138	136	135
K	4.9	6	6.5	6.8	4.8	4.5	4	3.7
PH	7.38	7.30	7.28	7.20	7.32	7.30	7.35	7.38
HCO3	16	14	13	10	20	18	22	24
Ca	8.5	8	7.5	7.4	8	8.5	8.6	8.8
UA	3.5	6	7	9	8	8	6	5.2
ALT	60	80	85	96	90	56	33	30
AST	100	150	200	250	230	110	80	40
BIL	4.6	10	13	18	12	4	1.3	1
BIL.D	1.1	2	3	5	3	1.5	0.3	0.3
BIL.I	3.5	8	10	13	9	2.5	1	0.7
Alb	3.5	3.2	3	2.5	2.8	3	3.4	3.8
CPK	2500		4700	6000	2500	300	190	160
D. dimer	0.3			0.5				0.2
Coombs	-ve							
Retix	4 %			8%			2%	
INR	1			1.2			0.9	
HBS Ag	-ve							
HCV Ab	-ve							
HIV Ab	-ve							
ANA	-ve							
ADS DNA	-ve							

HB (hemoglobin), MCV (mean corpuscular volume), WBC (white blood cell count), PLT(Platelet), Na (sodium), K (potassium), CPK (creatine phosphokinase), ALT(Alanine Aminotransferase), AST (Aspartate Aminotransferase), Ca (calcium),UA(uric acid), BIL.D(direct bilirubin), BIL.I(in direct bilirubin), ALB(albumin), HBS Ag(hepatitis B surface antigen), HCV Ab(hepatitis C virus antibody), HIV Ab(human immune deficiency virus antibody), ANA (antinuclear antibody), ADS DNA(Anti-double stranded DNA).

DISCUSSION

Misoprostol is a prostaglandin E1 analogue that can be used for cervical ripening and uterotonics. Its toxic effects on pregnant women may result in hypertonic contractions of the uterus that can lead to adverse consequences such as fetal distress and death, hyperthermia, respiratory alkalosis, hypoxemia, metabolic acidosis and rhabdomyolysis[11].

We report a rare case of hemolysis and rhabdomyolysis of unclear cause, which could potentially linked to boiled cola either due to it is direct effect or induction of misoprostol toxicity despite being administered at a therapeutic dose.

Our patient received the recommended therapeutic dose of misoprostol, however she presented with rhabdomyolysis and acute kidney injury. After excluding other potential causes of rhabdomyolysis, the recent history of using misoprostol and frequently boiled cola, raised our suspicion as the possible cause of her condition.

Belde Kasap, **et al.** reported a case of a 16-year-old boy who presented with acute kidney injury (AKI) that was attributed to chronic heavy consumption of cola. Habitual ingestion of cola with high levels of glycyrrhizin content may lead to hypokalemic rhabdomyolysis[12]**.**

Barros et al., reported a case of a 29-year-old pregnant woman who developed rhabdomyolysis and acute renal failure after receiving 8mg of misoprostol (7mg intra vaginally and 1mg orally) in an attempt to induce abortion, the woman presented to a hospital emergency room with fever , chills, and confusion, 3 hours after taking misoprostol. A Transvaginal ultrasound revealed a 5-week pregnancy. Laboratory investigations revealed metabolic acidosis, elevated liver enzyme (ALT 36 U/L and AST 154 U/L) , rhabdomyolysis (creatine kinase 7690 U/L) and acute renal failure (creatinine 1.8 mg/dL)[13.]

The CBC of the patient revealed acute hemolysis with leukemoid reaction, a sepsis screen was done and the results were negative, other causes of hemolysis were excluded. The blood picture was improved by supportive measures and we considered the boiled cola to be the cause of hemolysis and jet black blood, but no finding in the literature supporting our results.

Thereafter, we acknowledge that the present study has some limitations; further multi-center studies are needed to study the hazards of boiled cola and it is relation to hemolysis, rhabdomyolysis and renal affection, as well as any potential association between boiled cola and misoprostol toxicity.

CONCLUSION

This is a rare case of rhabdomyolysis 2ry to misoprostol and boiled cola complicated by acute kidney injury that required hemodialysis for one month then the patient recovered and stopped hemodialysis, therefore we have to pay the attention and awareness of health care providers to advise all pregnant women to avoid heated or boiled cola especially when they received any medications that have an adverse effect on muscles or kidneys as it may accelerate it is toxic effect and leading to dangerous effect on body organs.

Abbreviations

ER: emergency room
CK: creatine kinase
ARF: acute renal failure
AKI: acute kidney injury

PGE1: Misoprostol is a prostaglandin E1
CBC: complete blood count
AST: Aspartate Aminotransferase
ALT: Alanine Aminotransferase

Declarations

Availability of data and materials

The datasets used during the current study may be made available from the corresponding author upon reasonable request.

Ethical approval and consent to participate

All procedures were performed in accordance with the Declaration of Helsinki and have been approved by the Ethics Committee of Faculty of Medicine, Aswan University, Egypt. (Asw.uni./523/3/21).

Consent for publication

Written informed consent was obtained from the patient for publication of this case report. A copy of the written consent is available for review by the Editor-in-Chief of this journal.

Competing interests

The authors declare that they have no competing interests.

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